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| 10/773,758      | 02/06/2004  | Julin Wan            | 02307Z-132800US     | 4026             |

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EXAMINER

LOPEZ, CARLOS N

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

1731

DATE MAILED: 09/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/773,758

Applicant(s)

WAN ET AL.

Examiner

Carlos Lopez

Art Unit

1731

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 June 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>5/20/04</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

Applicant's election of claims 1-18 in the reply filed on 6/6/05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Step "a" of claim 1 activates a powder mixture. Step "b" of claim 1 recites consolidating "said powder mixture". It is unclear if the phrase "said powder mixture" in step "b" refers to the powder mixture that has been activated by step "a" or the powder mixture that is used in step "a". The phrase "said powder mixture" in step b fails to distinctly point out which powder mixture is being referred to. The same deficiency is found in claims 2,4-6,8-10 and 17, it is unclear if in reciting the phrase "said powder mixture", applicant is referring to the powder mixture being used in step "a" or an activated powder mixture.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as obvious over Wan et al (Silicon Nitride-silicon Carbide Nanocomposites Fabricated by Electric-Field-Assisted Sintering) in view of Riedel et al (A Silicoborn Carbonitrite Ceramic Stable to 2,000°C). Wan et al discloses a method of making a dense silicon nitride and silicon carbide crystals. The method comprises activating a 200mesh (75 microns) powder of amorphous silicon nitride and silicone carbide by high-energy ball milling the powder (See Experimental Procedures). The activated powder is then sintered, deemed as the claimed consolidation step, by a plasma sintering system, electric-field-assisted sintering, which by definition passes an electric current through the powder mixture.

Wan et al is silent disclosing the size of the powder after is activated by ball milling. However, in view that the powder already passes through a 75 micron sieve it is deemed as obvious to a person of ordinary skill in the art to have particles within the claimed size range of 1 to 100 nanometers. Moreover, due to the ball milling of the 200 meshed powder, particles having 75 microns or less, the ball milling step done in activating the powder would further reduce the particle diameters and thus it would be least obvious to a person of ordinary skill in the art to have particles within the claimed range of 1 to 100 nanometers.

Additionally, Wan notes that composites with grain size well below 100nm can be achieved if the amount of yttria, a metal oxide densification aid, is less than 3% (See

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last paragraph of the left column in page 526). Hence, the claimed invention of having crystalline grains less than 100nm is clearly taught by Wan by using a metal oxide densification aid of less than 3%, which would encompass applicant's claimed range of at most 1%.

Wan et al is drawn to the making of silicon nitride-silicon carbide nanocomposite ceramic. Reidel teaches that Si-C-B-N ceramics are stable at higher temperatures than Si-C-N ceramics. Hence, at the time the invention was made it would have been obvious to a person of ordinary skill in the art to have provided a ceramic nanocomposite of Si-C-B-N as taught by Reidel instead of a Si-C-N ceramics composite in order to provide a ceramic composite that is stable at higher temperatures.

As for claim 2, the ceramic produced with polymer precursors are amorphous.

In regards to claims 3-6, Wan et al as noted above envisage the claimed parameters.

As for claims 7, the silicone carbon and nitrogen content is 28%, 43%, and 22% based on the nominal formula noted in the first paragraph of the right column in page 526 of Wan.

As for claims 8-9, Reidel's Si-C-B-N ceramic is made by crosslinking and pyrolysis of a polyureasilazne which as noted in Figure 1 of Reidel is made by adding a borane.

As for claims 10-13, the claimed pressure, current and temperature is disclosed in the first paragraph of the right column in page 526.

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As for claims 14-16, in view that the claimed steps a and b are performed by Wan et al, it would be inherent or expected that the particles would have the claimed densities.

As for claim 17, see above.

As for claim 18, the balling milling is done with silicone nitride balls. The claimed impact rate and charge ratio are obvious process parameters adjusted to obtain the desired particle size and process time.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Lopez whose telephone number is 571.272.1193. The examiner can normally be reached on Mon.-Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571.272.1189. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CL

Handwritten signature consisting of a stylized 'L' and 'Z' followed by the date '8/11/05'.